What is Claim d is:

1. A method for processing a substrate, comprising:

depositing a first anti-reflective layer; and

depositing a second anti-reflective layer on the first anti-reflective layer by a process comprising:

introducing a processing gas comprising a compound comprising an oxygen-free silane-based compound and an oxygen and carbon containing compound to the processing chamber; and

reacting the processing gas to deposit a nitrogen-free dielectric material on the substrate, wherein the nitrogen-free dielectric material comprises at least silicon and oxygen.

2. The method of claim 1, wherein the oxygen-free silane-based compound comprises one or more compounds having the formula Si_XH_{2X+2}, $Si_XH_YCl_Z$, $(R)_ZSi_XH_Y$, or combinations thereof, wherein X is 1 to 4, Y is 0 to 2X + 1, Z is 2X +2, and R is an organic group.

3. The method of claim 1, wherein the oxygen and carbon containing compound is an organosilicon selected from the group of tetraethoxysilane (TEOS), triethoxyfluorosilane (TEFS), 1,3,5,7-tetramethylcyclotetrasiloxane (TMCTS), dimethyldiethoxysilane, and combinations thereof.

4. The method of claim 3, wherein the ratio of the oxygen-free silane-based compound to the oxygen-containing organosilicon compound is between about 1 sccm:20 mgm and about 6 sccm:5 mgm.

5. The method of claim 1, wherein the second anti-reflective layer comprises silicon, oxygen, and carbon, and has an oxygen content between about 15 atomic percentage and about 50 atomic percentage of oxygen.

6. The method of claim 1, wherein the processing gas further comprises an inert gas selected from the group of argon, helium, neon, xenon, or krypton, and combinations thereof.

7. The method of claim 1, wherein the reacting the processing gas comprises generating a plasma at a RF power level between about 50 watts and about 10,000 watts at a pressure between about 1 Torr and about 50 Torr and a substrate temperature between about 100°C and about 1000°C.

8. The method of claim 1, wherein the first anti-reflective layer is depositing by introducing a second processing gas comprising a compound comprising an oxygen-free silane-based compound and an oxygen and carbon containing compound to the processing chamber and reacting the second processing gas to deposit a nitrogen-free dielectric material on the substrate comprising at least silicon and oxygen.

9. The method of claim 1, further comprising an oxide capping layer disposed on the second anti-reflective coating.

10. The method of claim 1, further comprising exposing the second anti-reflective coating to a nitrogen-free oxidizing plasma.

11. The method of claim 1, wherein the first anti-reflective coating and the second anti-reflective coating have a combined reflectivity below 1percentage.

12. The method of claim 1, further comprising:
depositing a photoresist material on the anti-reflective coating; and
patterning the photoresist layer.

13. The method of claim 12, further comprising:
etching the second anti-reflective coating and any underlying dielectric material to define an interconnect opening therethrough; and
depositing one or more conductive materials to fill the interconnect opening.

14. The method of claim 1, wherein the oxygen and carbon containing compound is carbon dioxide.

15. The method of claim 1, wherein the first antireflective coating has an extinction coefficient that is higher than the extinction coefficient for the second antireflective coating.

16. The method of claim 1, wherein the processing gas further comprises an inert gas selected from the group of argon, helium, neon, xenon, or krypton, and combinations thereof.

17. The method of claim 1, wherein the deposited nitrogen-free dielectric material has an index of refraction between about 1.5 and about 2.2.

18. The method of claim 1, wherein the deposited nitrogen-free dielectric material has an extinction coefficient of between about 0 and about 2.

19. The method of claim 7, wherein the reacting the processing gas comprises generating a plasma at a RF power level between about 50 watts and about 10,000 watts at a pressure between about 1 Torr and about 50 Torr and a substrate temperature between about 100°C and about 1000°C.

20. The method of claim 1, wherein the first anti-reflective coating and the second anti-reflective coating have an etch selectivity of oxide to anti-reflective coating of about 4:1 or greater.